# MIDDLE-MANAGEMENT STRUCTURE AND PHILOSOPHY AS AFFECTED BY THE COMPUTER

by

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Lyle Phillips Creadick

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State University of New York, 1960

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Thesis directed by

Edwin Timbers, Ph.D.
Director
Navy Graduate Financial Management Program

## PREFACE

Of primary importance in a study of this nature is the establishment of the various limitations within which analysis of the middle management spectrum is measurable.

The scope of this study, to achieve a meaningful focus, must necessarily exclude analysis of specific computer technology and systems programming. Under consideration is the "why" of the subject, not the "how," which is presently a well-established discipline.

Also, notice is invited to the accent on business versus governmental middle management, as it is felt that initial movement into areas of change will occur in the former sector.

The final constraint, not included within the specific subject areas, concerns the concept of computerized process control. This is primarily an effect upon lower operating echelons and is not the issue under consideration. It is felt that the dynamic changes will occur in the management information systems of the middle management level. This is because of their planning and decision-making functions concerned with applying new computer capabilities to the lower echelons to the extent to which their activities involving processes and operations can be programmed.

Finally, the writer wishes to express his sincere appreciation to the many professional business executives who made valuable time available to discuss the subject

area and its related problems and ramifications.

The writer gives special thanks to Arthur Cella, Elton Johnston, and Scott Leesberg of American Greetings Corporation and Robert Fry, Waverly Smith, and Robert Baker of the St. Paul Fire and Marine Insurance Company, not only for their warm hospitality and pertinent contributions, but also for inspiring the assistance of the entire staff of both corporations, which gave added meaning to the value the writer feels is intrinsic to the exploration of the future situation of middle managers.

L. P. Creadick
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## INTRODUCTION

### Problem Area

> Over the last decade, a new technology has begun to take hold in American business, one so new that its significance is still difficult to evaluate. While many aspects of this technology are uncertain, it seems clear that it will move into the managerial scene rapidly, with a definite and far-reaching impact on managerial organization.[1]

It is, essentially, a technology concerned with information and information systems; an "information technology."[2] It is complex in nature, and, at this time, rather nebulous in direction, or focus. At the crux of this dilemma confronting American industry are the uses, by management, to which the awesome efficiency and capacity of the modern electronic computer will be employed. The techniques for processing large amounts of information rapidly, with the concern for the resultant impact on organization managerial structure, epitomizes the problems facing the top management and organizational planners of today.

These problems encompass a variety of variables

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[1]Thomas L. Whisler and Harold J. Leavitt, "Management in the 1980's," Harvard Business Review, XXXVI (November-December, 1958), pp. 41-48.

[2]Ibid.

of both practical and philosophic nature. The entire question is shrouded by subjective points of view within organizations and represents, in fact, a valid conflict. What is good for one corporation may cause extensive organizational damage in another. However, certain generalizations and predicable impact forecasts can be submitted as inevitable.

The original hypotheses upon which the initiation of this investigation is based involves four basic predictions, upon which analysis will be submitted and evaluation conducted in terms of the text material presented.

These include:

1) That the role(s) of middle-management will be more dynamically affected by computerization than either top-level management or lower-level supervisory positions.

2) That the involvement of middle-management in change will be a function of the type of industry involved, (i.e., Services or Production).

3) That the revolution will result in re-evaluation of middle-management functions which will call attention to and probably cause elimination of one or more strata, and compression of those remaining towards the upper and lower ends of the spectrum.

4) That the management organization structure changes will result in gravitation towards a centralized organizational philosophy except in those cases where computerized operations fail to permit effective decisional control at the central headquarters of top-management level. Furthermore, this effect will actually

facilitate the greater geographic decentralization of enterprise due to the increased communications capability of computers.

The primary areas in which the greatest degree of subjectivity is to be found are those dealing with the question of centralization vs. decentralization and its related issues concerning the uses of information as the key to the decision-making process. Of perhaps primary importance is the realization that the two sides to that particular coin are the geographic vs. philosophic applications of either centralized or decentralized structure, but particularly as related to the latter. As the literature will indicate, the correct focus has not yet been achieved to any large degree by many representatives of American industry.

This discussion will be concerned primarily with the philosophic centralization question and deal with geography only as far as it can be demonstrated to be of lesser significance as a constraint than is claimed by some dyed-in-the-wool decentralists.

Since the decision-making mechanics are the heart of the organizational structure, it is necessary to examine the impact of computerization of mass data banks on those who generally make such decisions--"middle-management."

Within any organization, who comprises "middle-management"? And, what is middle-management's reaction to the two primary facets of computerized information technology: first, that computers are merely, "many,

many people,"[3] and second, that computers also have the ability to make--and, at a minimum, facilitate--high-speed, accurate, and effective decisions of an extremely complex nature?

The implications of these facets are now becoming clear to middle managers, and their alarm is not entirely without substance. The resultant alternatives of having their ranks greatly thinned, or their decision-making responsibility removed holds little cause for optimism concerning the computer impact.

The point is that computer-impelled change is a very real problem in American industry today, and the establishment of effective methods to adapt to this change will be one of the principal determinants of future business success.

Implicitly, any requirement to change raises the question of whether the change is good or bad. Although this is a consideration, it is a function of whether or not it can practically be integrated under existing conditions to the point where it is accepted as desirable.

Amidst all this seeming confusion, however, one aspect of the revolution appears clear and inevitable: the problems coming up will be concentrated at the middle-managerial level. They will evolve from changes induced in organizational structure by the combination of computers and management science, by information technology, and by operations research applications.

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[3]Interview with Scott Leesberg, Director, Systems Division, American Greetings Corporation, January 20, 1967.

These are the problems of the 1960's and 1970's. Better understanding of organization theory may aid the manager in effectively adapting his organization to these technological impacts.[4]

The adapting of the organization to technology will be discussed from the points of view of the corporation, as evidenced by the case studies included herein, and the middle-manager himself who is at the mercy of the profit motive and the extent to which his own initiative, imagination, and desire for educational advancement enable him to cope with his new role.

Finally, the conclusion will discuss recommended adaptive measures, along with those submitted throughout industry, for middle managers and organizations alike. In addition, it will attempt an organization structure prediction and compare it to those of industry management. In general, then, discussion will be centered around recommended procedures facilitating the orderly adaptation to change by middle-management to the greatest advantage of all factions in terms of the predicted impact of computer technology on that stratum of organizational structure.

There remains for preliminary clarification, however, the interrelated tasks of defining middle-management and describing its reaction to the impending impact of computer technology.

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[4]Thomas L. Whisler, "The Manager and the Computer," The Journal of Accountancy (January, 1965), pp. 27-32.

## Middle Management Defined

As previously suggested, a clear and concise delineation of the middle-management stratum is not easily accomplished. It is, again, a subjective question, largely determined at the discretion of the parent organization, if it is delineated at all. In one large insurance company, no organization chart was available, specifically to discourage the structuring of an individual's personality, loyalty, and general focus to the point where he might resist or resent transfer to another position under jurisdiction of another supervisory agent.[5]

Still other examples can be found where the company's structure is published for the information of all employees. In short, middle-management is different things to different people. Therefore some arbitrary definition, as consistent as possible with current practices, must be made if analysis concerning that group is to be meaningful.

Definitions of middle-management can be found ranging from "top marketing executive,"[6] to corporation "salesman,"[7] or, vice presidents down to department heads,"[8]

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[5]Interview with Waverly G. Smith, Secretary, Agency and Marketing Department, St. Paul Fire & Marine Insurance Company, December 9, 1966.

[6]George Berkwitt, "Middle Managers vs. The Computer," Dun's Review and Modern Industry (November, 1966), p. 40.

[7]Interview with Arthur Cella, Government Sales Manager, American Greetings Corporation, January 20, 1967.

[8]Berkwitt, loc. cit.

and, "all levels of management between those which report to an officer of the company, and those which are responsible for the first decentralized structural level of the corporation."[9]

This latter is, of course, a very subjective point of view, but it signals a significant observation. There is no one level of middle-management, but several! For purposes of this study, three will form the basis as impact levels: upper-middle, middle-middle, and lower-middle.

Specific definition remains as a practicality, however, nearly impossible. What is possible is perhaps a series of generalizations. They would, when applied to a specific corporation, either production or services, facilitate delineation of the desired middle-management segment. This would possibly occur only by implication, unless of course a published formal organization structure exists.

The size and extent of operations is certainly a factor, however, the span of middle-management must extend from the first divisional or departmental level, to the first production level, even if that level is decentralized geographically or its "production" consists of a service (e.g., insurance company branch office manager).

It is implicit that within the framework of this concept, all three segments of middle-management are

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[9]Interview with Elton E. Johnston, Assistant Vice-President, Administrative Systems Division, American Greetings Corporation, January 20, 1967.

included. Also, that this concept cuts across line and staff functions in the sense that a research and development division probably has a home office staff of specialized sub-departments (or divisions) but has no lower "production" level and is therefore only staff. A sales division, however, has beneath it not only the staff subdivisions, but more than likely the geographically decentralized branch sales offices or regions as well. The former consists of the two upper segments of middle-management. The latter contains all three.

In addition, the concept implies that in some instances, corporation officers will comprise upper-middle management and in some they will not. This will be a direct function of size in most instances and will exist irrespective of corporate selection of managerial titles, e.g., Executive V. P., Staff V. P., Secretary, V. P., etc. Experience dicates that delineation by titles is the most inefficient method, especially for purposes of comparison between two or more corporations. The related applicability of titles between any random selection of corporations is virtually non-existent.

What, then, within the constraints on the concept, and the concept itself, is the rationale of selection? It is simply a chain of command, communication network, or responsibility ladder through which the operating data and feedback essential for decision-making is communicated. This network progresses from the consolidated, geographically decentralized operating facility, to the senior functional supervisory level of management, via that supervisor's staff departments. It is within this framework of upper-, middle-, and lower-middle

management upon which further analysis will be based.

## The Computer: Middle Management's Reaction

According to one observer, "behind the closed doors of the business world, a silent but bitter battle is being waged."[10] No doubt a revolution is indeed under way, but when did it begin, what is its reason, and what is the reaction to it?

Although computers first became available commercially in the early 1950's, " . . . few managers had investigated their possible application with any thoroughness before about 1955. For most companies, the use of computers required no decision before that time because it (simply) hadn't been placed on the agenda."[11] Since then, of course, our 35,000 computer systems have gained widespread support and have been the vehicles facilitating, among others, the new concepts in information technology.[12]

What is the reason, then, that causes middle management to fear this revolution enough to wage its silent battle?

One reason is its almost certain acceptance

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[10]Berkwitt, loc. cit.

[11]Richard M. Cyert, Herbert A. Simon, and Donald B. Trow, "Observation of a Business Decision," Journal of Business, XXIX (1956), pp. 237-248.

[12]Berkwitt, loc. cit.

by top management. Furthermore, implicit in top acceptance of computerized information technology systems is its promise to allow top management to control middle management, "just as Taylorism allowed the middle to control the bottom."[13]

There is also cause to fear a very rapid change. Information technology promises to allow fewer people to do more work. The more it can reduce the number of middle managers, the more top managers will be willing to try it. "Improvisations and adjustments" are likely to prove inadequate in view of the rapid technological and complicated growth of the business environment, and "radical re-thinking of organizational ideas is to be expected."[14]

Also to be expected is the initial resentment by middle management, as well as insecurity, and a need for top guidance concerning preparation for their roles in the organization of the future. They can do nothing rationally to prevent the change, but they can expect top-level consideration of their problem and interest toward its social and personal implications.

The typical middle manager appears to take little comfort, however, from the declaration by one social scientist that he is hardly fated "to go the way of the dinosaur." Nor does "he derive any real sense of security from all the evidence that the automatic office or plant, run with brisk efficiency with only one of two overseers, still lies in the remote realm of science

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[13]Whisler and Leavitt, op. cit., pp. 41-48.

[14]Ibid.

fiction. In his apprehensive state, the middle-management man is easy prey for the preachers of doom."[15]

In spite of numerous reassurances, they continue to overlook such cheerful conclusions as: "If they were good at their jobs before the computer, its arrival on the scene will do nothing to make them obsolete."[16]

Also ignored is such advice, based on experience, that: "As you might expect, when the smoke of these reorganizations cleared away, the managers who survived and thrived were those who early saw the advantages of the new systems and new organizations."[17]

How, then, can top management calm the fears and curb the resentments of the middle-executive ranks? The question is not easily answered. Their "concern about personal adaptability to a mechanized system, uncertainty as to their roles in it, or fear of losing status as supervisors of large numbers of skilled workers" is of no minor influence.[18]

Perhaps their major concern, however, should be the significant statistics depicting no gain or even reduction in their ranks simultaneously occurring with dramatic corporate growth records. It appears that the consistent theme of re-education of a formal nature and the mental willingness to make the system work, to adapt to it until it becomes desirable, is the key to success

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[15] Ibid.

[16] Berkwitt, loc. cit.

[17] Whisler, op. cit., p. 28.

[18] Berkwitt, op. cit., p. 40.

within the organizational structure of the future.

> For better or for worse, then, middle management faces a stern ultimatum to adapt. Top executives customarily show little patience with anything that gets in the way of corporate performance. Thus increasing signs of discontent and resistance in the ranks of middle managers are likely to speed rather than delay the adoption of the computer in company operations.[19]

> Under these conditions, the old conditioned responses and habits no longer apply. Industry generally is moving toward inviolable standards of performance and output. Managers, must operate largely by the book, meaning that decisions, programmed with the inhuman efficiency of the computer, are far more mechanical than they used to be. In addition, the middle manager must deal with a greater variety of information, requiring more rigorous analysis and decision-making. However, the manager with foresight, intelligence, courage, willingness to accept responsibility, and familiarity with all phases of the enterprise apparently will not be made obsolete, either by the computer or by the technician who knows only how to program and operate it, if he is prepared to utilize traditional qualities in a radically different context.[20]

The context in question seems to focus around the understanding of the framework of entire systems. This growing pressure is focused on the middle manager's ability to appreciate the new decision-making sciences and to recognize the computer's ability to help him achieve corporate objectives. All of this again strongly implies the need for further education as the primary adaptive tool, both formal and informal.

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[19] Ibid.

[20] Ibid.

Yet, middle managers continue to resist the computer, and the necessity for relearning its use demands, as they are increasingly held responsible for this kind of understanding. "Specialists who have achieved some job tenure and whose diplomas are now gathering dust often show a surprising reluctance to go back to school. To some, the sight of one of their number taking courses is a cause for derision."[21]

Whether or not a specific company moves into the new business environment of computer technology overnight, or at a slower pace allowing the recommended educational process to occur, the middle manager continues to face one pressure that will not wait: "The progress of the computer itself."[22]

As will become evident through review of the case studies to follow, progressive American corporations are establishing departments of staff specialists to exploit the abilities of the computer applicable to their business to the greatest extent possible. For example, one firm anticipates the use of the "utility concept," allowing a tele-communications network to be connected from over fifty branch offices to the central computer bank. The attendant increase in service and speed, vital to this firm's reputation, as well as prestige and goodwill advantages, is enormous.[23]

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[21] Ibid.

[22] Ibid.

[23] Interview with Robert L. Fry, Secretary, Operations Research Department, St. Paul Fire and Marine Insurance Company, December 9, 1966.

Some are of the opinion that the implications of such a data communications system will make middle management's problems of the future "look puny indeed" as they will "have to wrestle with data pouring in constantly from distant offices and plants."[24] It is submitted that perhaps the exact opposite will be true. The ability to select specific information randomly from a mass data storage bank may eliminate hours of the middle executive's day. Normally, these are the hours spent wading through mundane and routine paper work, whose only value may be in the formulation of statistics.

The middle manager reasons and selects from among alternatives, and he arrives at what are called decisions through his intelligence guided by experience or memory. He also deals with people. It is as simple as that. He should allow the computer, having the data-gathering and sorting advantage, to perform the former, and he, having the creative and social advantage, the latter.

Of course, this is relative: the upper-middle manager will be able to make human decisions based upon computer information to a greater extent than the lower-middle manager. It is hoped that this important condition of relativity is not ignored.

In summary, then, the reaction of the middle manager to his position in relation to the computer is one of irony. "For the first time in industrial history, those who will be most affected by a technological change

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[24]Berkwitt, loc. cit.

are also those responsible for initiating and planning it."[25]

According to Berkwitt, "The position of the middle manager, then, is an ambivalent one. But the inescapable conclusion is that in the age that is now dawning, neither the middle manager nor the computer can get along without the other. Neither, it is safe to say, is headed for extinction. It remains for the enlightened executive to upgrade his own abilities to meet today's sterner challenge. Then he will be in a better position to work out some form of peaceful--and hopefully prosperous--co-existence with his electronic rival."[26]

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[25] Ibid.

[26] Ibid.

## CHAPTER II

## ORGANIZATION STRUCTURE AND PHILOSOPHY

### Centralization vs. Decentralization

Any discussion concerning the possible shift, relocation, or reorganization of the physical or conceptual relative position of an organizational stratum, such as "middle management," is incomplete without also examining the framework within which the subject functions. In conjunction within this concept, examination of the decisional processes which either facilitate, or are a by-product of, this organizational framework becomes necessary.

This section will attempt to enumerate and elaborate upon specific aspects of organization structure as they relate to the computer impact upon the centralization-decentralization controversey. Mention is made of "specific aspects" of organization structure because it appears that (1) previous examination has been limited to sweeping generalities, and (2) the previous practice of pure decentralization has been uncontrolled in relation to the true desires of top management. This is a trend with which they were forced to live, not one they themselves had chosen, and one which the computer may reverse when its specific, applicable uses are examined by individual corporations.

With regard to the former, the observation of

Herbert Simon that administrative description suffers from . . . "oversimplification," and a "lack of realism" is especially true in this context. He submits that,

> We talk about organization in terms not unlike those used by a Ubangi medicine man to discuss disease. At best we live by homely proverbs (and I quote another executive): "The important thing about organization is to have the right man in the right place." At worst we live by pompous inanities: "The relationship between a delegant and his deputy arises from delegation and is invariable in character."[1]

With regard to the latter, a more complete analysis of the decentralization concept is imperative.

> Over the past twenty or more years there has been a movement toward decentralization in large American business organizations. This movement has probably been a sound development, but it does not signify that more decentralization is at all times and under all circumstances a good thing.
>
> There are usually two pressures toward greater decentralization in a business organization. First, it may help bring the profit motive to bear on a larger group of executives by allowing profit goals to be established for individual subdivisions of the company. Second, it may simplify the decision-making process by separating out groups of related activities--production, engineering, marketing, and finance for particular products--and allowing decisions to be taken on these matters within the relevant organization subdivisions. Advantages can be realized in either of these ways only if the units to which decision is delegated are natural subdivisions--if, in fact, the actions taken in one of them do not affect in too much detail or too strongly what happens in the others.[2]

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[1]Herbert A. Simon, Administrative Behavior (New York: The Macmillan Company, 1957), p. xiv.

[2]Herbert A. Simon, The New Science of Management Decision (New York: Harper & Brothers Publishers, 1960), p. 44.

This point of view is the subject of current criticism on both arguments. In the case of profit motive and the related philosophy of executive training for long-range managerial adeptness, the long-postponed philosophy of "man-to-man management"[3] is emerging. This is facilitated primarily by communication of the operational situation to the management hierarchy via the computer.

Whereas top management has previously depended entirely on middle management's transmission of the data felt at lower levels to be pertinent to current operations and future implications, the computer now enables top management to do the selecting of significant information and data required for the decisional process. This selection process tends to counteract the pressures toward greater decentralization.

As will be discussed later, an increased level of education concerning modern informational and decision-making technology is offered in rebuttal of the implied training advantage of decentralization.

Furthermore, it is becoming increasingly difficult to allow decisions made by separate, unrelated facets of an organization--such as production, marketing, and finance--to fall into place naturally as a pattern of policy. This policy, then, actually determined at lower levels, forces top management to assume responsibility for operations over which it has relatively little control. As mentioned, this has been the case,

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[3]Lecture by Hilary Faw, Assistant Treasurer, International Business Machines, Inc., Poughkeepsie, New York, October 27, 1966.

not as a matter of choice but of circumstance, which top management will change as rapidly as computer technology will permit.

It is interesting to note that as Simon discusses the relative benefits of either philosophy, his support of centralization is clear and unconditional. His discussion of decentralization, however, is usually conditioned by a situation which he has previously described as lacking reality, as demonstrated in his following observations.

> Consider a single organization with a goal, which may simply be to maximize profits. The organization has at its disposal certain resources, and its problem is to achieve a maximum attainment of its goal subject to the limits of its resources. Clearly, if one person or group of persons possessed all the relevant information connecting possible courses of action with the utilities resulting therefrom, he or they could discover which course of action was best for the organization, (assuming both complete information and unlimited computing capacity). This would constitute Central Planning in its simplest form.
>
> As an alternative procedure, we would simulate within the organization the operation of markets and the price mechanism. Then each part of the organization would purchase its inputs and sell its outputs, whether to other parts of the organization, or outside the organization. We call a procedure of this kind decentralized decision-making through prices.
>
> We might hope that if the criteria of the subparts of the organization were properly chosen, the same course of action would be taken as under central planning, i.e., that the "invisible hand" would make optimal choices for the organization as a whole.[4]

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[4]James G. March and Herbert A. Simon, Organizations (New York: John Wiley & Sons, 1958), pp. 201-202.

The advocacy of purposeful movement towards recentralization, however, is not without opposition. It is the result of a combination of situations. One, of course, is the uncertainty created by the encroachment of the computer upon the domain of the middle manager. He is singularly unequipped to predict with any degree of accuracy the impact on American industry as a whole, because his present environment is structured and relatively secluded, and he is emotionally involved in his situation.

Thomas Whisler recognized these resistance factors recently when re-examining his prediction of 1960 that information technology would recentralize control in organizations.

> That contention has provoked strong reaction--some very respectable management consultants arguing that the prediction was exactly backward; that further decentralization will result from computer applications. But in a company that experienced the 30 per cent shrinkage in managerial positions, production planning, accounting and purchasing are now accomplished centrally for three scattered facilities, each of which formerly was its own boss. Observed changes, then, support the predictions of the flatter organization and the recentralization of control.[5]

Another situation which exemplifies this resistance to centralization is that of the moral, social, and personal ego satisfactions derived from an ideologically pure decentralized organization. The image of the middle manager as decision-maker, omnipotent supervisor of men, and financial tycoon is one with

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[5]Whisler, op. cit., pp. 27-32

which top management will need to deal almost simultaneously with the recentralization process. It is not the middle manager's attitude concerning his image with which this process is now faced, but that of top management.

It is top management which has facilitated and sanctioned this philosophy over the years to be as sure as possible that they were receiving the best possible management by their middle-level managers. Now they will be forced to replace this philosophy with another. The solution will not be easy and is sure to be financially expensive in the form of salaries, wages, benefits, and working and recreational facilities.

Whisler and Leavitt comment on the situation in the following manner.

> Largely after World War II, participative management, seriously overtook--and even partially displaced--scientific management. Individual incentives, for example, were treated first as simple applications of Taylorism, but they have more recently been revised in the light of "participative" ideas.
>
> The scientific and participative varieties both survived. One reason is that scientific management concentrated on the hourly worker, while participative management has generally aimed one level higher, at middle managers, so they have not conflicted. But what will happen now? The new information technology has direct implications for middle management as well as top management.
>
> Some of the sparing use of information technology may be due to the fact that those of us with a large commitment to participative management have cause to resist the central implications of the new techniques. But the implications are becoming harder to deny.
>
> Information technology will spread rapidly. One important reason for expecting fast changes in current

practices is that information technology will make centralization much easier. It will allow the top level of management intelligently to categorize, digest, and act on a wider range of problems. Moreover, by quantifying more information it will extend top management's control over the decision processes of subordinates.

If centralization becomes easier to implement, managers will probably revert to it. Decentralization, after all, has been largely negatively motivated. Top managers have backed into it because they have been unable to keep up with size and technology. They could not design and maintain the huge and complex communication systems that their large, centralized organizations needed. Information technology should make recentralization possible. It may also obviate other major reasons for decentralization. For example, speed and flexibility will be possible despite large size, and top executives will be less dependent on subordinates because there will be fewer "experience" and "judgment" areas in which the junior men have more working knowledge.

Some of the psychological reasons for decentralization may remain as compelling as ever. For instance, decentralized organizations probably provide a good training ground for the top manager. But though interest in these advantages should be very great indeed, it will be counterbalanced by interest in the possibilities of effective top-management control over the work done by the middle echelons.[6]

And so it goes, the non-commital recognition of the benefits of centralization combined with an unlimited communication and control system--the computer. Perhaps the most applicable comment in support of the centralized philosophy and in preparation for the following section is to be found in these observations by Herbert Simon.

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[6]Whisler and Leavitt, op. cit., pp. 41-48.

> The automation of important parts of business data-processing and decision-making activity, and the trend toward a much higher degree of structuring and programming of even the nonautomated part will radically alter the balance of advantage between centralization and decentralization. Since the source of the savings is in the coordination of this decision-making activity, centralization is unavoidable if the savings are to be secured.[7]

> Centralization is sometimes urged as a necessary concomitant of the specialization of work. If work is specialized, then procedures must be introduced to secure coordination among the members of the group; and among the most powerful of coordinative procedures is the centralization of decisions.[8]

## The Decision-Making Process

Any discussion of the centralized-decentralized organizational structure controversy is reduced to idle banter without realization that both exist only to facilitate effective decision making. Also necessary is acknowledgement that decision making is indeed the heart of administration.[9]

The computer and the new decision-making techniques associated with it are bringing changes in white collar, executive, and professional work as momentous as those brought by the introduction of machinery to manual jobs.[10]

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[7]Herbert A. Simon, The New Science of Management Decision (New York: Harper & Brothers Publishers, 1960), p. 46.

[8]Herbert A. Simon, Administrative Behavior (New York: The Macmillan Company, 1957), p. 238.

[9]Ibid., p. xvi

[10]Herbert A. Simon, The New Science of Management Decision (New York: Harper & Brothers Publishers, 1960), p. 42.

One of the major contemporary issues of change in organization design is the question of:

> . . . how centralized or decentralized the decision-making process will be--how much of the decision making should be done by the executives of the larger units, and how much should be delegated to lower levels. The question is not whether we shall decentralize, but how far we shall decentralize. What we seek, again, is a golden mean of moderation: we want to find the proper level in the organization hierarchy--neither too high nor too low--for each important class of decision.[11]

The two primary classes of importance are programmed and nonprogrammed decisions.

> Characteristically, the jobs of today's hourly workers tend to be highly programmed--an effect of Taylorism. Conversely, the jobs shown at the tops of organization charts are often largely unprogrammed. They are "think" jobs--hard to define and describe operationally. Jobs that appear in the big middle area of the organization chart tend to be programmed in part, with some specific rules to be followed, but with varying amounts of room for judgment and autonomy.[12]

The primary effect of the computer in this area is submitted to be a trend towards the further programming of these middle-management decisions. This is felt to be of no minor importance to organization structure of the future when the characteristics of programmed and non-programmed decisions are more closely examined.

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[11] Ibid., p. 45.

[12] Robert N. McMurry, "The Case for Benevolent Autocracy," Harvard Business Review (January-February, 1958), p. 82.

Programmed decisions tend to permit an adaptive response of the system to the situation, through the use of a detailed strategy that governs the sequence of response of a system to a complex task environment.[13]

Non-programmed decisions require a response when the system has no specific procedures to deal with situations like the one at hand, but must fall back on "whatever general capacity it has for intelligent, adaptive, problem-oriented action."[14]

Not only is the cost in time and money often prohibitive for this type of problem solving within organizations, but it is not always effective. Mistakes in judgment are not unusual, men often fail to solve problems, or they reach unsatisfactory solutions. In addition, greater organizational control is unattainable through a non-programmed decision-making system. Since control is the coordinative factor essential to the centralized point of view, programmed decision making is not only desirable, but advisable.

Furthermore, the non-programmed decision process is one which depends largely upon an orderly thought process. Though possibly a deficient tool of a specific middle manager, it is hardly a constraining factor in terms of the modern computer.

An analysis by Herbert Simon of this subject appears particularly pertinent at this juncture.

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[13]Herbert A. Simon, The New Science of Management Decision (New York: Harper & Brothers Publishers, 1960), p. 27.

[14]Ibid.

> Making programmed decisions depends on relatively simple psychological processes that are somewhat understood, at least at the practical level. These include habit, memory, simple manipulations of things and symbols. Making non-programmed decisions depends on psychological processes that, until recently, have not been understood at all.[15]

To define non-programmed decision making as the ability to "exercise judgment," which depends "in some undefined way," upon experience, insight, or intuition is to name the phenomenon, not explain it.[16]

In view of this background, then, what are the specific implications of computer usage as concerns the decision-making process among middle management?

As Simon observes about this future structure, "its shape is not discernible," and further comment to include his own predictions is necessary.

> The electronic computer is bringing about, with unexpected speed, a high level of automation in the routine, programmed decision making and data processing that was formerly the province of clerks.
>
> The area of programmed decision making is being rapidly extended as we find ways to apply the tools of operations research to types of decisions that have up to now been regarded as judgmental--particularly, but not exclusively, middle management decisions.
>
> Companies are just beginning to discover ways of bringing together these developments: of combining the mathematical techniques for making decisions about aggregative middle-management variables with the data-processing techniques for implementing these decisions in detail at clerical levels.[17]

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[15] Ibid., p. 29.

[16] Ibid.

[17] Ibid., p. 38.

The first of these observations is for the great part a reality today, as industry utilizes the computer to perform everyday routine tasks. The enormous data base facilitated by mass storage capabilities, however, must be applied to enable the second and third observations to find their way into a new, meaningful philosophy concerning middle management.

What is being discussed here is the increased capability of middle and top management to communicate with the operating echelons and among themselves in a revolutionary manner. The instantaneous availability of operational information is indeed the key to eliminating the judgmental middle management variables of the decision-making process. It also allows centralized top-management overview, and effective, coordinated, and timely feedback of decisions to operating levels by middle management.

This concept is supported by the statement of Simon that, "the difficulties of transmission from sources of information to decision centers tend to draw the latter toward the former, while the difficulties of transmission from decision centers to points of action create a pull in the opposite direction."

Further that,

> The pulls that tend to bring about a centralization of the decision-making functions and a consequent separation of decision from action ... are the need for responsibility, expertise, and coordination. The two principal pulls ... (toward) decentralization are, first, the fact that a very large portion of the information that is relevant to decisions originates at the operating level, and second, that the separation of decision from action increases the

time and man-power costs of making and transmitting decisions.[18]

Through the use of the high-speed computer in achieving the capability of random access to specific, selected information from a mass data storage base, the difficulties of transmission are alleviated. The possible movement of computer information between sources, decision centers, and points of action is not only easily facilitated, but actually encourages centralized control by top management. Computerized communication allows them the advantages of geographic operational decentralization, simultaneously with coordinated central decision-making.

This is a concept which will be developed more fully in a later discussion, but is noteworthy at this time in order to submit this seemingly incongruent position concerning the centralization-decentralization controversey.

Notice that Simon's subsequent observations also dwell on those inadequacies present without the use of a computer system, which in fact enables responsibility, expertise,[19] and coordination.[20] The observation that a very large portion of the information relevant to decisions originates at the operating level is immaterial and no longer a constraint. This is true if the collateral observation upon which it depends, that communication

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[18]Herbert A. Simon, Administrative Behavior (New York: The Macmillan Company, 1957), p. 157

[19]A tailor-made mass data storage base.

[20]The ability to randomly select data and interrogate the data-linked system components.

inadequacies between decision and action increase the time and manpower costs, is intrinsically false within the context of computer technology.

Precisely what is it that is being demonstrated by the preceding arguments? Top management in contemporary American industry is on the scent of decision-making control. This was once lost by their inability to absorb the magnitude of diversified data flow. This naturally led to the adoption of that power by the operating middle levels, which had become decentralized because of diverse sales and labor markets and a myriad of economic and fiscal advantages. It has also been shown that the scent is being strengthened by the revolution in information technology and carried on the winds of the electronic computer. Therefore, the organizational stratum which will be most radically effected by top management's inevitable centralization will be that of middle management.

Basically, the rationale behind this computer-oriented revolution is that by the exercise of authority or other forms of influence it is possible to centralize the function of deciding. This will enable a general plan of operations to govern the activities of all members of the organization. This centralization of the decision-making process among lower top management and the new upper stratum of middle management will be facilitated simply by removing from the hands of the subordinate the actual decision-making function.[21]

The next logical step concerns the "why" of the issue. What is the reason, or purpose in an organizational

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[21]Simon, loc. cit.

revolution of such magnitude? Although this has previously been touched upon briefly and will be additionally obvious upon inspection of the case studies the following observation is submitted at this time in the interests of background and clarification.

> As organizations have proliferated in size and specialization, the problem of control and integration of supervisory and staff levels has become increasingly worrisome. The best answer until now has been participative management. But information technology promises better answers. It promises to eliminate the risk of less than adequate decisions arising from garbled communications, from misconceptions of goals, and from unsatisfactory measurement of partial contributions on the part of dozens of line and staff specialists.[22]

In short, the present discussion can be summarized by saying that "the new developments in decision-making will tend to induce more centralization in decision-making activities at middle management levels."[23]

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[22]Whisler and Leavitt, op. cit., pp. 41-48.

[23]Herbert A. Simon, The New Science of Management Decision (New York: Harper & Brothers Publishers, 1960), p. 47.

# CHAPTER III

## CASE STUDIES

The intent of this section will be to familiarize the reader with several points of view, or business philosophies, of American corporations participating in the computer revolution. It is not intended that the inference be drawn that the representative corporations capsulate the views and concepts of the American industrial scene. However, they are indicative of the emphasis being placed upon uses of the computer by those corporations presently utilizing it in a product-control type operation and whose increasing mass data storage induces them to appreciate the need for revising their organizations.

In addition, the corporate opinions expressed here have been made by those responsible executives who will be largely instrumental in developing their corporation's management information and decision systems. Their comments, then, are highly valued. Although they represent a small portion of the business community they are considered to be an accurate and perceptive indication of that community's thought processes with regard to the computer.

## SERVICES INDUSTRIES

### Case Study: The St. Paul Fire & Marine Insurance Company

The St. Paul is one of the nation's largest insurance companies in terms of written coverage, which includes fire, auto, health, accident, marine,[1] and an entire range of special coverage policies. They have insured crops against hail, a supermarket which dropped ping-pong balls from a helicopter, British homes against World War II air attack damage, the swans of a small town, and an English King's horses.[2]

This unusual situation arises from the fact that the St. Paul is geographically separated from the major U. S. insurance area in the Northeast. Since 1853, when the area was only a territory, it has accepted risks on a merit basis and was not hampered by the "you just can't do that" attitude of the established firms. This has led to an emphasis on innovation with a constant effort to improve service as opposed to service-oriented insurance companies who lag in the innovation area.[3]

The St. Paul employs 4,200 people, 2,100 of which are located at the home office. These employees are

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[1]"Marine" insurance covers movement or transportation of any nature, and is not restricted to that occuring over water or the high seas.

[2]Interview with Waverly G. Smith, Secretary, Agency and Marketing Department, St. Paul Fire & Marine Insurance Company, December 9, 1966.

[3]*Ibid*.

assisted in their work by an extensive computer system. This system consists of a self-owned IBM 7080 with eleven tape drives, an IBM 1401 system, and a Honeywell H-200 with six tape drives and a paper tape reader. Storage of the two latter units is 36K, and the entire system, which operates three daily shifts five days per week, is augmented by a Farrington optical scanner, which is able to read entire pages or a single line.[4]

The concept of innovation previously expressed is significant with regard to the St. Paul's establishment of an Operations Research Department in late 1966. This department is referred to as the "dream" department performing a "blue sky" activity for the St. Paul, and whose official functions are listed in the Appendix.[5]

Of particular note at this time however, are the following excerpts:

"We will direct our activities and attention toward a maximum use of electronic and mechanical equipment."

"We will develop and describe new uses for electronic equipment as our Companies' needs and equipment abilities and availability became apparent."

"We will continuously modify the Company functional organization structure as changes in systems and automation require."

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[4]Interview with Edward T. Carlson, Systems and Programming, St. Paul Fire & Marine Insurance Company, December 9, 1966.

[5]Interview with Robert L. Fry, Secretary, Operations Research Department, St. Paul Fire & Marine Insurance Company, December 9, 1966.

"We will use our computers in activities commonly referred to as Operations Research, Management Science Techniques, and so forth, to assist the Company in evaluating past and proposed actions while formulating plans and actions of the future."

A typical problem area to which Robert Fry, director of the new Operations and Research Department has successfully applied his "blue sky" philosophy is the elimination of personnel traffic and related time and resource allocation connected with daily reporting. The previous sequence of this process was as follows:

1) Request for an individual record was made to the file department.

2) The file department located the record in sequence within the file, which was obtained by manual search.

3) The requester was then placed in sequence with other staff members requiring the same record for different information.

4) The record was ultimately delivered, acted upon, and returned to the file department manually.

5) The record was re-filed in sequence and then returned to the file storage area.

Mr. Fry estimates that 25 per cent of the desired records were unavailable in the file, of which 7 per cent took one week to receive and 2 per cent took two weeks.

Through the use of a computerized status report overlay system, more than one person could examine the same information in much less time.[6]

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[6]A sample "Easy-Auto" policy status report is included in the appendix.

The implications of this procedure are indeed great in terms of middle management's ability to be aware instantaneously of data selected at random from mass computer storage. This enables them to eliminate many of the information variables from their decision-making process.

Of course, in the case cited, the gain is also realized in personnel, however, no intended elimination is intended, but a policy of "hiring only according to need" is certainly within the realm of possibility.[7] The possibility even exists of an increased personnel need, as the middle manager is simply able to do so much more through use of the computer than he has in the past, thereby requiring an augmented clerical staff.

In the larger context is the computer applicability to the St. Paul's "service-center" concept of branch offices. In the insurance industry the manager is particularly close to the details of his environment. Decisions arise from analysis of these mass details, and therefore attention is focused on the role of the service-center manager. He is geographically decentralized from the home office and is presently fairly autonomous as concerns underwriting functions as well as the examination and adjustment of claims and losses.[8]

The image of the St. Paul's operating structure envisioned as soon as 1969 is one of virtually complete

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[7]Interview with Robert L. Fry, Secretary, Operations Research Department, St. Paul Fire & Marine Insurance Company, December 9, 1966.

[8]*Ibid*.

centralization. The concept involves the addition of seven centers to the fifteen existing facilities, and eventually a total of thirty, plus those required due to growth between now and 1969.[9] These geographically decentralized units would be equipped with cathode ray, key-to-tape facilities capable of direct transmission to the home office computer once or twice daily. These interrogations would be answered by the computer through use of stored data tapes also on a daily basis.

The service center would also serve as a data capture device for the home office master tapes, which would then facilitate verification by one office to an office in another state of a claimant's insurance status as a result of, for example, an auto accident away from home.

All this is intended to be accomplished via the home office computer and through the use of telecommunications. This would enable the transmission of one thousand characters per second on Western Union or telephone lines with the computer dialing the desired telephone number.[10]

While this procedure is essentially process-control computerization, the implications for the home office and service center middle manager remain ominous. Besides having more free time for additional tasks and broader responsibility his decision-making function has

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[9]Interview with Waverly G. Smith, Secretary, Agency and Marketing Department, St. Paul Fire & Marine Insurance Company, December 9, 1966.

[10]Interview with Robert L. Fry, Secretary, Operations Research Department, St. Paul Fire & Marine Insurance Company, December 9, 1966.

been greatly sophisticated.

With his additional consolidated assignments and resultant enlarged responsibility, he has essentially changed the structure of his environment. He has made himself relatively more important while reducing the status of his lower counterpart to that of a technician. This squeezing of the segments of middle management upward and downward is destined to remove his "inability to obtain policy information"[11] when he needs it, and facilitate his entrance into the realm of centralized decision-making with the help of the computer.

## Case Study: Government Employees Insurance Company

GEICO, the seventh largest automobile insurer in the United States is, in reality, a family of five corporations with combined assets of $350 million and an annual business volume approaching a quarter of a billion dollars. Their other lines of insurance include homeowners, fire, comprehensive personal liability, and boatowners. This is a rather stable condition, caused by the exclusion of unusual or unique coverage.[12]

To facilitate processing the large data base intrinsic to the insurance industry, GEICO utilizes two 10K computer storage units which perform 200 "edits" and "audits" on 1.25 million individual records once daily

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[11] *Ibid.*

[12] Interview with Robert F. Springer, Vice President, Data Processing, Government Employees Insurance Company, Washington, D. C., March 13, 1967.

during eighteen weekly shifts.[13]

The services of the Government Employees Group are available through sixty-three geographically decentralized "Branch" and "Sales and Service" offices in twenty states. Their leadership corresponds in corporation rank to the home office Division Manager and Assistant Manager. The next echelon is the Department, managed by a Vice-President, who is an officer of the Company, and his Assistant.

Of significance at GEICO is this narrow range--i.e., only two levels--of middle management operating within a "company of committees."[14]

Four major operating and coordinating committees--Personnel, Operations, Casualty, and Computer Usage--all report and make recommendations to the top-level committee composed of the Board Chairman and the five Presidents of the GEICO "group."

Of interest is the Computer Usage Committee, chaired by none other than the GEICO President, whose efforts are directed at corporation-wide involvement in specific applications of computer technology in various areas.

Improved service is a company goal, but GEICO's young female clerical force is the area in which labor turnover is greatest. Therefore, computerized reduction in process time, assistance in human engineering, and policy-rating ability is of prime importance to the

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[13] Ibid.

[14] Ibid.

Computer Usage Committee.

Within five years, GEICO anticipates substantially greater reliance upon the computer in other areas as well. At the present time, middle managers are brought from divisional sub-committees to offer guidance to major committees on specific research conducted, manually for the most part. Sophisticated computerization, however, is seen to facilitate the acceptance of these Divisional Managers as a necessary, integral part of the top committee management.

It will be within the realm of their responsibility to dream up those reporting systems necessary for them to advise top management accurately on cash reserve requirements based on anticipated claims. In addition, it will be their function to determine the effect of auto production, highway construction, auto registration by state, and concentration of response to mail solicitation upon premium revenue goals and requirements.[15]

This is an excellent example of middle managers being responsible for initiating and developing changes which affect them most and also the upward compression of the upper-middle stratum of middle management in direct proportion to their role of facilitating and maintaining central control.

The ultimate evolution of GEICO's computerized technology is anticipated to involve random access by all decentralized Branch and Service Offices through the use of telecommunications. This procedure should do much

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[15] *Ibid.*

to substantiate the predicted centralization of control and compression downwards of those below the Divisional Manager into data accumulators. It should simultaneously enable that manager to generate more timely and accurate decisions and be drawn upwards into an enlarged, upper-middle, "management-by-committee" environment.

## PRODUCTION INDUSTRIES

### Case Study:
### American Machine & Foundry Company

American Machine & Foundry Company manufactures a diversified line of products for industry, government, and the consumer around the world. This is facilitated by eight operating "Groups" and two staff "Divisions," comprising fifty-three "business units."[1]

It is essentially a consolidation of subsidiaries and, with regard to organizational structure, is very similar to a holding company.

The uses of the computer presently at AMF operating levels are primarily those of process control. They have extensively computerized the machinery utilized for the diversified processes and operations intrinsic to their product line as well as the management functions of the several decentralized business units.

At present, no special branch for computer systems research exists, because the corporation is committed to a practice of autonomy concerning its business units. However, the implementation for financial reasons of a "regional service center" concept of computerization--rather than access to computer facilities through rental, ownership, or sharing by each business unit--is anticipated to prepare AMF to adopt an integrated management information system.

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[1]Interview with Col. Carl Baldick, USAF, Ret., American Machine & Foundry Company, February 3, 1967.

Daily decision making at the business-unit level is presently an autonomous function. Business units have full responsibility for research and development, production, marketing, and distribution. Evaluation is accomplished through profit-loss analysis.

Encroachments on this system are those decisions concerning large capital outlays such as new production facilities. They do not include, for example, a bowling ball color change and may or may not include a price change.

This policy is subject to review by the Group Executive, and the Operations Management Board, which consists of the Corporation President or Board Chairman, the Comptroller or Treasurer, the Secretary, and one or two other executives.[2]

For the most part, corporate decision-making involves the appraisal of performance criteria, budgets, and union negotiations. Relatively few operating decisions are made at the corporate level, due mainly to the lack of availability of an effective management information system. Utilization of the regional service center computer facilities for this purpose should move the subsidiaries and divisions away from their present complete autonomy and provide for more interjection by corporate executives. With computerization as the impetus, levels and depths of information never before available could be provided.

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[2]Interview with Steven Falk, Director, Management Information Division, American Machine & Foundry Company, February 3, 1967.

Historically, in a production-oriented company, the plant manager is a key individual, who controls inventory, effective allocation of sales resources, procurement, and logistics. These could all become a collateral duty as computers remove the routine but pressing decisions of the daily production cycle from the control of the plant manager and his staff and allocate them to computer programs. "This will result in a whole new breed of middle managers."[3]

The function of computers within this context will be two-fold: (1) to make decisions possible and (2) to implement these decisions. Realization of this concept will depend on how rapidly philosophic advances are made. Progress has been extremely slow in recent years, due in large part to the mystique about computers which shrouds their operation in a cloud of uncertainty and mystery. This is an educational problem essentially, and AMF's elimination of this phenomenon is necessary prior to the achievement of further integrated information system progress.

In addition, AMF intends the physical merging of the computer hardware into regional service centers, and the development of mass data storage capability. This should enable random, instant access to information by top and middle management and result in the management information system predicted by AMF. With it should finally evolve a "new breed" of middle management from "Group Executives" to "Business Unit Managers"[4] who find themselves

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[3] Ibid.

[4] Ibid.

making centralized policy decisions in a radically different organizational structure.

## Case Study: American Greetings Corporation

American Greetings is among the three largest manufacturers of greeting cards in the country, with net sales in 1966 exceeding $77 million. A wholly owned subsidiary, the North Carolina Display Fixture Company, Inc., produces display cabinets for American Greetings Corporation which are furnished free of charge to retail dealers rather than sold or rented. This practice, in addition to postpaid greeting card shipment to retailers, is unique to the industry and accounts for the fact that American Greetings Corporation grosses more "greeting card" revenue than any other manufacturer, although it is not first in total dollar sales.[5]

The philosophy behind that practice of this 6,000-employee corporation is one appealing to the retailer trying to increase the total number of his accounts. New income has more than doubled since 1960, and is representative of all other measures of corporate growth as well.[6]

The greeting card industry is unique in several ways, caused primarily by an unusual combination of marketing characteristics. It is a fashion industry dealing in large volume at a low manufacturing cost. It is also a non-stock controlled industry where the salesman writes

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[5]Interview with Arthur Cella, Government Sales Manager, American Greetings Corporation, January 20, 1967.

[6]*Ibid*.

individual orders and is referred to as a "re-order business."[7]

The computer, however, has revolutionized this concept of business and now enables the salesman to cover more territory and handle more accounts than ever before. For every card on the display rack, there is a package, or "bag," of duplicate cards in reserve in the drawers beneath the cabinet. About four cards from the end of the supply is found the inevitable punch-card, which is simply forwarded to Cleveland for re-supply together with other "tickets." This system handles 16-18 million tickets annually from 70,000 accounts.[8]

At the computer center the punch cards are transcribed on magnetic tape into orders involving one transaction for each punch card submitted. An individual account record is also created for use in conjunction with the account "display diagram" which was submitted previously by the salesman and later computerized.[9]

The purpose of this process is three-fold. Data is provided in such a manner that a specific price and caption card of any specific account can be instantly subjected to a "turn-test" interrogation.[10] It can also be checked with the account's display diagram for possible re-evaluation of the optimum display in terms of the type

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[7]Interview with Scott Leesberg, Director, Systems Division, American Greetings Corporation, January 20, 1967.

[8]*Ibid*.

[9]*Ibid*.

[10]*Ibid*.

of store, geographic area, predominant race and/or religion of customers, and factors concerning local greeting card competition.

The third purpose is one of inventory interrogation at the distribution point with regard to the possible substitution of a comparable price and caption card if the one re-ordered is temporarily out of stock.

The latter is a process-control type of operation. However, the implications of the two former purposes have not been overlooked as a possible source of data to be utilized as a mass data base for a "Management Information System."[11]

As envisioned and planned at American Greetings Corporation, their "M.I.S." will consist of three data bases; inventory, Everyday Orders, and Seasonal Orders.[12] The integration of these three is described in the following manner.

> Certain primary processing functions must be performed as necessary, or "bread and butter," activities of the business. While the primary function is being performed, a data base of detailed information concerning the function is established. While the primary user receives the output of the primary processing activity, other users, located in all divisions of the company, are able to draw upon the data base for the information they require for the performance of their responsibilities. Value analysis principles must be consistently applied to assure that the value of the reports requested from the data base

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[11]Interview with Elton E. Johnston, Assistant Vice-President, Administrative Systems Division, American Greetings Corporation, January 20, 1967.

[12]*Ibid*.

justifies their cost to extract.

For example, the primary process functions, in addition to process-control reporting, from an input of order cards, provide sales and diagram data to the research department upon request.[13]

Although this data base is as yet partially incomplete, top priority in systems planning is being assigned to completing the base.

This involves the development of a feedback system to provide the data base with detailed information. When this feedback system has been established, the ... data base will be able to stand alone and produce complete by-product reports for all departments that require such information.[14]

As presently conceived, completion of the development of all three of these Management Information Systems would create a management information network encompassing all major activities of the business.

As a result of this network, and the "centralization of computer operations in a Data Computer Center" during 1966,[15] American Greetings Corporation is aware of the inevitable changes which must occur in their organization philosophy and middle-management structure. This concept of computerized operations can only lead to the decline in status of the regional supervisor and the advancement of computer-oriented and educated middle managers.

With this advancement--social, financial, or

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[13] Ibid.

[14] Ibid.

[15] American Greetings Corporation, 1966 Annual Report, p. 6.

structural--they will assume an increasing volume of the planning and decision-making responsibilities. This will simultaneously reduce the necessity for large staffs at the intermediate level, shrinking the ranks of median-middle management, and facilitating the return to top management of centralized operational control.

# CHAPTER IV

## CONCLUSION

In order to focus the reader's attention concerning the framework within which any subsequent analysis is submitted, attention is invited to a brief review of the purposes of presenting the preceding material.

Although the information obtained has been varied, and in some instances subjective, it involves a re-evaluation of the advantages and limitations of centralization vs. decentralization as a function of computerized operations. It is also concerned with management levels affected by computers in representative industries and associated educational requirements needed to interpret data for decisional purposes.

This information also involves educated forecasts, gained through interviews with those in a position to predict the impact of computerization on their organization. Finally, it concerns middle and top management philosophy changes within an organization concerning, for example, autonomy and responsibility concepts.

The implications of, and conclusions drawn from, analysis of the material investigated has intrinsic value primarily to the business sector of the economy. This is not to say that the analysis is meaningless to governmental counterparts. To the extent that the government is able to relate its management structure to

that of industry it is felt that their future prospects are indeed similar.

## Analysis

No attempt is made to deny or minimize the impact of the computer upon either top-level management or lower supervisory positions at the operating or production levels. However, the latter has previously been described as process control computerization, and it can be eliminated as significant for purposes of this study primarily because it has previously occurred.

The revolution in the automation of production processes and operations was naturally the area in which the greatest advances in computer technology could be made most rapidly. This has subsequently been accepted and adjusted to by the majority of operating echelons, but the upper limits of this type of computer activity have hardly been penetrated. Continued exploration of adaptable processes is obvious. The reaction and adjustment of industry to this impact is history, however, and is no longer an area commanding our major concern.

Nor is there cause to deny the impending changes in top management philosophy as a result of the computer. There will be several which will be discussed shortly, but theirs will not be the primary impact, only a secondary one. Their impact will be a direct result of the changes brought about within the middle-management structure. Top management will revise its philosophy only because it will have at its disposal the data it has lacked during the decentralization period to make timely

and effective decisions. It will absorb the data brought to it by middle management and elevate those instrumental in its capture. They will use that data to make policy decisions, change parameter values, and effect both long- and short-range planning.

Of significance here is that both these management levels are involved with the corporation's decision-making process, each concerned with refining goals and objectives of daily operations and long-range, short-range, and policy decisions. The re-structuring of middle management will be extensive, unlike that of top management, which will be able to do more than is presently possible utilizing the same quantity of top executives.

In final support of this concept, attention is directed to the fact that it is the decision of top management to acquire computer capability. Even so, it is the upper-middle managers, or those who will gravitate to that position, who are involved in the application of present computer uses and exploration and experimentation with new ones.

Their decisions and ideas will lead top management to realize that central control is once again within its reach and that structural changes in middle management necessary to facilitate that control are desirable. Top management will desire to pull those now instrumental to its control even closer to it than before. This pull will augment the push from within the middle level and facilitate structural shrinkage at a point slightly above the center.

Whisler describes this situation by noting that,

> At the present time, many chief executives tend to apply the familiar rule of delegation to the introduction of the computer. They okay its purchase and delegate responsibility for its effective application to some subordinate . . . (until they discover) the really important things that can be done with the computer, . . . (begin) to tinker with organization structure, managerial jobs, and fundamental organization, . . . (and finally) grasp the true nature of this new technology and assume . . . unavoidable responsibility for its introduction and application.[1]

The second introductory prediction has proved to be least accurate. It appears that the type of industry, be it service or production, is not nearly as important as size in determining the magnitude of involvement with change. Most corporations, including those presented as case studies, appear to be organized along similar lines, with the exception of size at the operating levels. AMF employs more factory workers and supervisors than AG does card salesmen, is more diversified as regards product line, is more geographically decentralized, and therefore employs more middle managers.

The issue, then, becomes one of size and the subdivision of the additional managers into decentralized subsidiaries. In larger corporations, the resultant squeeze, then, occurs at two levels: the plant, factory, or geographically decentralized unit and the corporation as a whole. This magnifies that effect into a totally greater involvement than the smaller company, whose squeeze occurs on only one plane--that of the corporate entity.

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[1]Whisler, op. cit., pp. 29-30.

Although it may appear that the premise of this analysis is contradictory because of the usual size advantage of a manufacturer over a service industry, it is anticipated that this gap will narrow in the future. Whereas the man-machine ratio may decrease in the production industries of the future, the personal contact required for the generation of service industry revenues may actually increase personnel absolutely as well as proportionately.

The third prediction is one which is presently causing the greatest concern, speculation, and need for resolution in the business environment. The prospect of completely eliminating a stratum of middle management, advanced by the "preachers of doom" as previously discussed, appears more remote a possibility, in view of the material presented, than the more rational alternative: a compression of certain functions within middle management towards the upper and lower ends of the managerial spectrum.

Of course, implicit within such a concept is the delineation of those functions which move upwards and those which do not. Notice that the phrase, "those which do not," accurately implies that the squeeze can become merely a redefinition of the criteria for advancement in terms of computer technology, simultaneously occurring with a combining of responsibilities at the new enlarged upper stratum. It does not imply mass elimination. As Thomas Whisler agrees:

> It isn't really a case of a layer of management being removed whole and intact. Rather, the computer takes over some parts of various positions. Subsequent consolidation produces new ones. In one

> company, as a consequence of this process . . . the result was the consolidation of two vice presidential jobs--those of vice president of production and vice president of merchandising.[2]

The essence of this concept emerges as a condition wherein the re-educated and computer-oriented executives within middle management are drawn and pushed upwards into the upper-middle stratum. Those who are not are compressed into lower echelons or merely not promoted, and will be satisfied to resign. The reason for this is that the criteria for advancement (which they now fail to meet) have been raised. This occurs as a result of the increased education and imagination necessary to deal with the realm of possibilities and horizons opened through the use of computer technology.

New horizons exist because, rather than restrict employment opportunities by eliminating the necessity for people, the computer has opened wide vistas of opportunity. It enables accomplishments which were previously unmanageable, impractical, impossible, or unimagined by top and upper-middle executives.

Again, many of the previous stepping stones to this predicted condition were covered by the waters of decentralization and the complicated formal, informal, vertical and horizontal communications networks inherent in that form of organization structure. Communication of data by computers obviates the necessity for decentralizing the decision-making processes. It allows and even facilitates enjoyment of the best of both concepts:

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[2]*Loc. cit.*

decentralized operations, sales, warehousing, and transportation on the one hand and retention of relatively centralized decision-making control on the other.

Illustration number (1) attempts to display graphically the predicted organizational structure of middle management in relation to both the current stratified or pyramidal shape of modern organizations, and the geographic and philosophic aspects of centralization and decentralization.

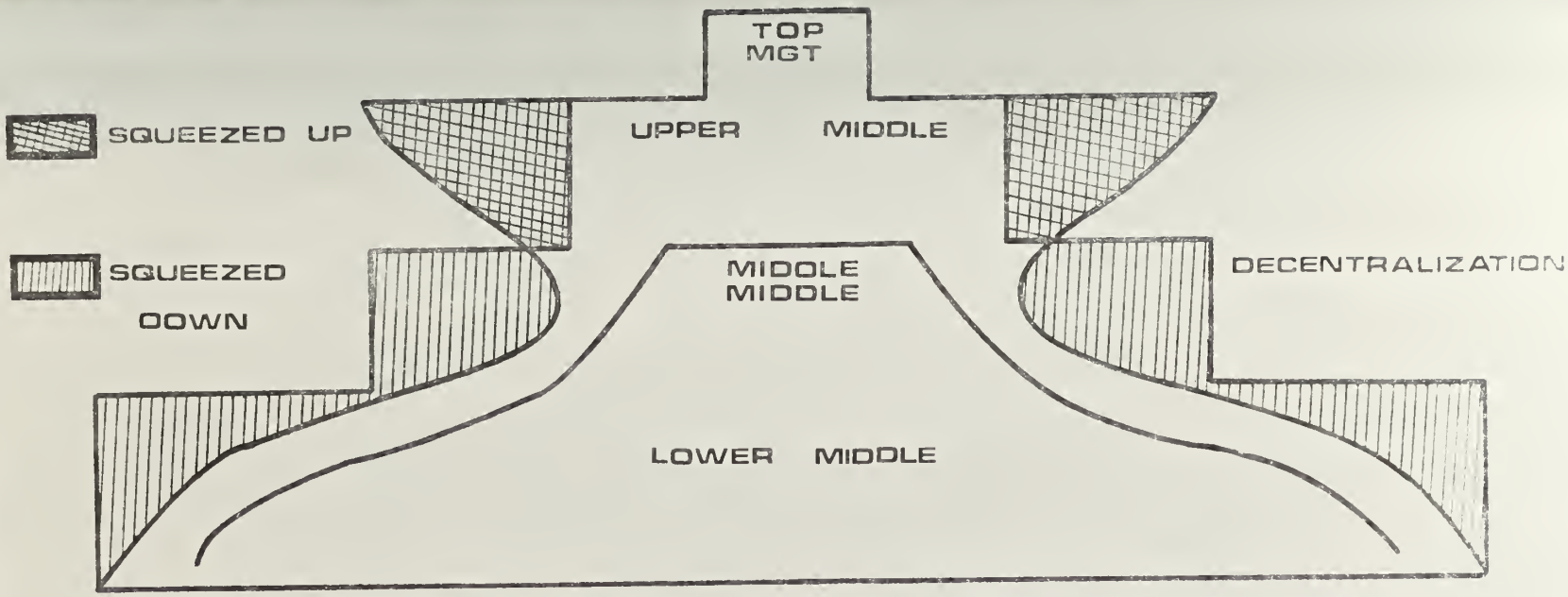
Although the impression may be received that the intent to clarify the computer dilemma throughout the text and analysis has resulted in an optimistic prediction of the situation after the revolutionary smoke clears, perhaps "realistic" would be the preferable adjective.

Executives will not naturally penetrate by osmosis their ultimate stratum and responsibility level in the new organizational structure. They will earn their positions by their ability to generate and adjust to change, primarily by advanced education, imagination, and effective use of programmed decisions and their application to the non-programmable decision processes.

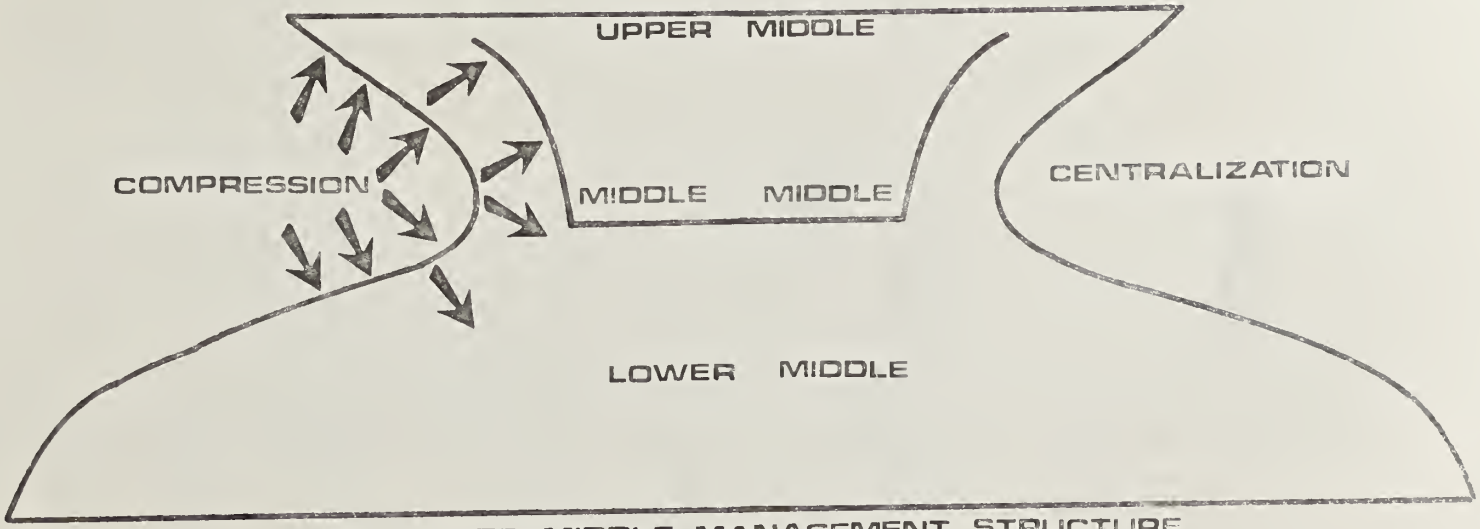
Of these, the requirement for the ability to adjust to change may, in reality, be the most important.

> Understandably, those who see their own positions being threatened by a change will be reluctant to adopt it. Resistance to change in the factory or office is so well known that we assume that it is peculiar to workmen and clerks. (It is submitted) . . . that this resistance is characteristic of all men, or at least of that portion of mankind which includes . . . executives.

"But," as Whisler adds, "for the first time--in




PRESENT STRATIFIED CONCEPT - PREDICTED STRUCTURE SUPERIMPOSED




PREDICTED MIDDLE MANAGEMENT STRUCTURE
"ANVIL EFFECT"

ILLUSTRATION 1

industrial history at least--those who will be most affected by the change are also those who are responsible for initiating and planning it."[3]

This concept appears to be at the crux of the dilemma and in fact is not as serious as is presupposed. Those unable to adjust will move on to other endeavors, perhaps into an industry as yet not computerized or will be satisfied to be compressed. Those seeking entrance will endeavor to meet the requirements, and then will be given the opportunity to prove themselves. Very little will have changed in reality.

As concerns the secondary effect of recentralization, the recombining of responsibilities and the addition of new ones at both levels of compression will no doubt do much to replace the ego and social satisfaction needs lost. It is submitted that this will occur in direct proportion to the autonomous authority for decentralized decision-making removed by central control.

In final justification of the optimistic philosophy, attention of the reader is invited to the reassurance by Herbert Simon concerning his evaluation of the computer impact on middle management.

> Perhaps in the preceding paragraphs I have yielded to the temptation to paint a Utopian picture of the organization that the new decision-making techniques will create. If so, I have done so from an urge to calm the anxieties that are so often and so unnecessarily aroused by the stereotype of the robot. These anxieties are unnecessary because the existence in the world today of machines that think and of theories that explain the processes of human thinking, subtracts not an inch, not a hair, from the stature of man.

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[3] Ibid., p. 30.

> Man must rest his case on what he is. This is in no way changed when electronic systems can duplicate some of his functions or when some of the mystery of his processes of thought is taken away.[4]

## Correlative and Supportive Literature

Extensive literature has been, and continues to be, offered to the business community concerning the subject material of this analytical project. This literature also involves related circumstances germane to the computer-management-organization-structure dilemma confronting modern American industry.

It is the intent of this section to present those forecasts which to some extent either amplify or support the predictions as stated. That focus is in no way intended to ignore any opposing points of view but to confine their presentation to situations where competent justification is also within the scope of this thesis. It is noted, however, that the major portion of the dissenting opinions observed are concerned with factors not intended for presentation herein. These opinions include predictions which concern structure or impact beyond the temporal constraints of this paper and are, therefore, inappropriate for consideration at this time.

Perhaps the single most common theme is that of the characteristics and methods of top management as directly affected by the computer revolution within middle management.

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[4]Herbert A. Simon, The New Science of Management Decision (New York: Harper & Brothers Publishers, 1960), p. 49.

The literature appears to support the concept of the top executive's role in central control as a part of a committee composed of specialists, advisors, vice-presidents, and assistants. Their function will be not only to advise but to follow through and insure that important policy decisions are carried out.

Although Leavitt and Whisler warn that under this concept, "the precise individual locus of decision may become even more obscure than it is today,"[5] the predictions persist.

President Joel Hunter of Crucible Steel Company foresees even more meaningful divisions of responsibility at the uppermost echelons. "There is a tendency at the top," he states, "to include more than a single executive in the role of chief executive in order to provide greater breadth. I suspect this will grow in larger and more complex companies."[6]

Whisler adds,

> Obviously, no one man can know all there is to know today in large organizations. It will be even less possible for him to be competent in the increased range of knowledge needed in tomorrow's organization. The breakdown of the traditional hierarchy with a single chief would seem to be inevitable simply because of this growth of knowledge. The use of multiple chiefs, or committee top management, is becoming increasingly popular in U. S. corporations and seems to be the first step toward the kind of general partnership arrangement into which management will move in the next few decades. The tide may

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[5]Whisler and Leavitt, op. cit., pp. 41-48.

[6]Thomas J. Murray, "Management Problems of Tomorrow," Dun's Review (February, 1967), p. 24.

> already be running strong this way. A Chicago executive I know, getting his first real exposure to the multiple boss arrangement, said to his secretary as he left for lunch, "If my boss calls, be sure to get his name."[7]

Concerning the primary issues of centralization and middle-management structural changes, the literature is increasingly supportive.

Whisler and Leavitt predict, "that large industrial organizations will recentralize, that top managers will take on an even larger proportion of the innovating, planning, and other creative functions than they have now." They also foresee, "a radical reorganization of middle management levels . . . with certain classes of . . . jobs moving downward in status and compensation (because they will require less autonomy and skill), while other classes move upward into the top management group."

They include in this latter group the programmers themselves, as well as jobs in research and development, and further explain, "that the horizontal slice of the current organization chart that we call middle management will break in two with the larger portion shrinking and sinking into a more highly programmed state and the smaller portion proliferating and rising to a level where more creative thinking is needed."

The result of their predictions is seen to be,

> an organization chart of the future (which) may look something like a football balanced upon the point of a church bell. Within the football (the top staff organization), problems of coordination, individual autonomy, group decision making, and so

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[7]Whisler, op. cit., p. 31.

on should arise more intensely than ever. We expect they will be dealt with quite independently of the bell portion of the company, with distinctly different methods of remuneration, control, and communication.[8]

The actual shape of the corporate chart envisioned by each observer may differ, sometimes sharply, sometimes subtly. It is felt that Sun Oil Company President Robert G. Dunlop displays the greatest accuracy in his statement concerning changes in the typical corporate structure during the coming decade which, he says, "will probably be in the direction of greater centralized control of planning, resource allocation and reporting activities, while at the same time providing for more decentralized execution of line functions within the framework of overall corporate strategy."[9]

The preceding predictions and opinions are presented without comment, as their relationship to the text presentation appears clear. They are included not so much for their content, sophisticated and pertinent as it is, but for their substantiation that the subject and related problems of this paper are real, current, and in dire need of solution. They are intended to satisfy the reader who asks, "so what?"

## Summary

Perhaps the most appropriate content for summation of the problem area is that which attempts to direct attention towards the available alternatives facilitating

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[8]Whisler and Leavitt, op. cit., pp. 41-48.

[9]Murray, op. cit., p. 25.

the orderly and beneficial adoption of change.

From the material presented, it appears accurate to assume that in the years ahead, almost every management task will be aided in one way or another by the computer. But for all the potential benefits expected as a result of computerization, there are still many challenges to be met in adapting to the new managerial structure and process.

The most persistent, according to a majority of chief executives, is to learn how to keep pace with all the information "spewed out by the chattering robot brain."[10]

As a possible additional solution, President Edward J. Hekman of Keebler Company urges the development of managers who clearly understand both their area of responsibility and overall corporate goals so that the computer can be asked the right questions. In this way, he feels, management can determine what facts it really needs.[11]

Whisler and Leavitt suggest, "closer liaison with appropriate research organizations," and a re-examination of "their own organization for lost information technologists."[12]

Whichever avenue the organization pursues, it must be combined with a formal process of re-education. It appears obvious that before impending changes can be

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[10] Ibid., p. 79.

[11] Ibid.

[12] Whisler and Leavitt, op. cit., p. 48.

dealt with intelligently and with explicit purpose, the "nature of the beast" must be known to whatever extent possible.

It is felt that, over time, the profit motive and the quest for successful private enterprise will overcome these seemingly insurmountable barriers and individual fears of change. All that appears needed is confidence and reassurance that, on balance, these changes "will make it easier rather than harder for the executive's daily work to be a significant and satisfying part of his life."[13]

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[13]Herbert A. Simon, The New Science of Management Decision (New York: Harper & Brothers Publishers, 1960), p. 50.

# APPENDIX

# EASY AUTO POLICY STATUS

| PROC. CHEK | OWNS. COMM. DATE MO | YR | CANCEL DATE MO | YR | TYPE CANCELLATION | REQUESTER |
|---|---|---|---|---|---|---|
| | 06 | 63 | | | | |

| NO. | POLICY NO. | CURRENT FROM | POLICY PERIOD TO | | YR. | MAKE | STYLE | AGE | COST NEW | DR. C.L. | LIA. TERR. | PHY. DAM. | ENCLM. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 04 | 2C03849 | 12 24 63 | 06 24 64 | CAR 1 | 63 | FORD | 1 | 2 | | 1A | 10 | 46 | * |
| | | | | CAR 2 | | | | | | | | | |

| INSURED'S NAME AND ADDRESS | | RISK STATE | TOWN OR TAX CODE | LIAB. CLASS | PHY. DAM. CLASS | 2ND CAR DISC | DR. TRNG. CREDIT | FIN. RESP. SUR. | COMPR. SUR. | CURCY DISC. | LA. DATE PURCH.NEW |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SSEY BUSSEY | CAR 1 | ALA | 00032 | | 1102 | 0 | NO | NO | NO | NO | |
| O S BCX 590 | CAR 2 | | | | | | | | | | |
| ISTCN ALABAMA | | | | | | | | | | | |

| BTH | CHILDREN'S AGES | | | | | CROSS REFERENCE | | OCCUPATION |
|---|---|---|---|---|---|---|---|---|
| | BOYS | | GIRLS | | EFF. DATE | | | |
| 18 | 10 | 02 | | | 06-63 | NO | | GOVERNMENT EMPLOYEE |

## PRESENT TERM COVERAGES

| BODILY INJURY | | PROPERTY DAMAGE | MEDICAL PAYMENTS | COMP. | COLLISION | TOWING & LABOR COSTS | PROTECTION AGAINST UNINSURED MOTORISTS | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | BODILY INJURY | | PROP. DAMAGE |
| EACH PERSON | EACH ACCIDENT | EACH ACCIDENT | EACH PERSON | DED. | DED. | | EACH PERSON | EACH ACCIDENT | EACH ACCIDENT |
| | | | | FULL | 50 | | | | |

## PRESENT TERM ENDORSEMENTS

| | DEATH LIMITS | NO. OF PERSONS | DISABILITY LIMITS | NO. OF PERSONS | MINOR ENT. NON-OWNED | EXTENDED NON-OWNED | EXTENDED MEDICAL | EXTENDED CLASS |
|---|---|---|---|---|---|---|---|---|
| R 1 | $ | | $ | | | | | |
| R 2 | $ | | $ | | | | | |

## PREMIUMS

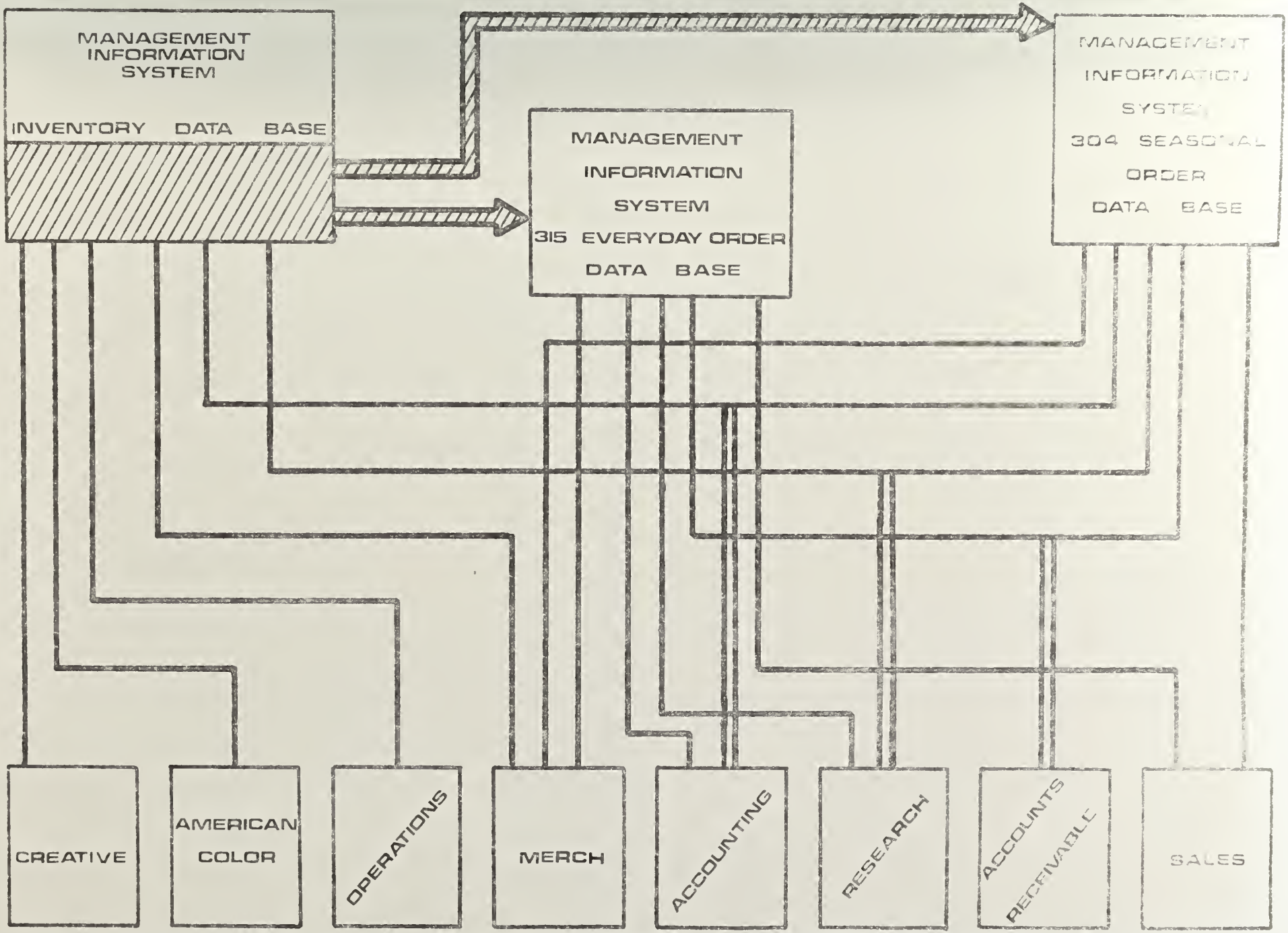
| | CAR | BODILY INJURY | PROP. DAMAGE | MEDICAL | COMP. | COLLISION | TOW & LABOR | UNINS MOTORIST | DEATH & DIS. | EXTENDED | TOTALS | ACT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NT | 1 | -0- | -0- | -0- | 8.70 | 20.00 | -0- | -0- | -0- | -0- | 28.70 | * |
| | 2 | | | | | | | | | | | |
| DUS | 1 | -0- | -0- | -0- | 10.20 | 23.00 | -0- | -0- | -0- | -0- | 33.20 | |
| | 2 | | | | | | | | | | | |

SAMPLE "EASY AUTO POLICY STATUS" REPORT

AMERICAN GREETINGS CORPORATION

MANAGEMENT INFORMATION SYSTEM

FLOW CHART




INTERRELATION OF THE THREE M.I.S. DATA BASES

AMERICAN GREETINGS CORPORATION

OPERATIONS RESEARCH DEPARTMENT:

STATEMENT OF FUNCTIONS

24 November 1966

FUNCTIONS OF OPERATIONS RESEARCH DEPARTMENT

I. We will direct our activities and attention toward a maximum use of electronic and mechanical equipment. The equipment concerned will include:

   A. Computers

   B. Data captured devices

   C. Output devices

   D. Teleprocessing machines

   E. Real time storage and inquiry systems

   F. Image storage and retrieval devices

   G. General mechanical office machines

II. We will develop and describe new uses for electronic equipment as our Companies' needs and equipment abilities and availability become apparent.

III. We will conduct research designed to improve, both in the Home Office and in service centers:

   A. Office systems

   B. Office arrangements

   C. Work flow and control

IV. We will continuously modify the Company functional organization structure as changes in systems and automation require.

V. We will use our computers in activities commonly referred to as Operations Research, Management Science Techniques, and so forth, to assist the Companies in evaluating past and proposed actions while formulating plans and actions of the future. The use of scientific techniques will be directed toward:

   Market Research

   Business Forecasting

[illegible]

## [illegible] OF [illegible] [illegible]

I. [illegible] [illegible] [illegible]

Simulations (evaluation of alternatives)

Linear Programming

VI. We will maintain a close contact with other insurance companies to be aware, continually, of their plans and practices in the areas of system design and computer usage.

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